

Taxonomic Status of *Aedes (Stegomyia) laffooni*
Knight and Rozeboom with a Redescription of
Aedes (Stegomyia) pseudalbolineatus Brug
(Diptera: Culicidae)¹

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ABSTRACT. *Aedes (Stegomyia) laffooni* Knight and Rozeboom and *Aedes (Stegomyia) pseudalbolineatus* Brug are 2 distinct species. Characters for separating *laffooni* from *pseudalbolineatus* are given. Male terminalia, female terminalia, pupa and larva of *laffooni* and female terminalia of *pseudalbolineatus* are described and illustrated for the first time. The range of *Aedes laffooni* is extended to include the Celebes.

INTRODUCTION

This paper has been prepared to clarify the taxonomic status of 2 species in the *albolineatus* group of species in the subgenus *Stegomyia* Theobald, genus *Aedes* Meigen.

Brug (1939) described *Aedes (Stegomyia) pseudalbolineatus* from Indonesia (Celebes, Kabaena Island and Sangir islands). Due to the inadequate descriptions and illustrations, the identity of this species has caused considerable confusion as shown in Knight and Rozeboom (1946) and Knight and Hull (1952).

Knight and Rozeboom (1946) described *Aedes (Stegomyia) arboricola* and *Aedes (Stegomyia) laffooni* from the Philippines. Under *arboricola*, they stated that the male was indistinguishable from the type description of the male of *pseudalbolineatus* Brug and the female was similar to type description of *pseudalbolineatus* except for the marking of the 3rd hindtarsal segment, and under *laffooni*, they stated that the male genitalia apparently was not

¹This work was supported by Research Contract No. DAMD-17-74-C-4086 from the U. S. Army Medical Research and Development Command, Office of the Surgeon General, Washington, D. C.

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 1978		2. REPORT TYPE		3. DATES COVERED 00-00-1978 to 00-00-1978	
4. TITLE AND SUBTITLE Taxonomic Status of Aedes (Stegomyia) laffooni Knight and Rozeboom with a Redescription of Aedes (Stegomyia) pseudalbolineatus Brug (Diptera: Culicidae)				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Medical Entomology Project, Smithsonian Institution, Washington, DC, 20560				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT see report					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 14	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

distinct from that of *arboricola*. This would imply that male genitalia are apparently not distinct from that of *pseudalbolineatus*.

Subsequently, Knight and Hull (1952) stated that after examining the type male and allotype female of *pseudalbolineatus* in the British Museum, *pseudalbolineatus* were found to differ further from *arboricola* in possessing an area of broad white scales on the lateral margin of the scutum just before the level of the wing base and no differences in male terminalia were noted. They also stated that *arboricola* is closely similar to *laffooni* in the adult stage, differing most noticeably from it in the absence of broad white scales on the lateral margin of the scutum. This indicated that both *pseudalbolineatus* and *laffooni* possess an area of broad white scales on the lateral margin of the scutum just before the level of the wing base.

Knight and Hull (1952 :187) stated, "An examination of the type male and allotype female of *pseudalbolineatus* Brug in the British Museum showed it to be very similar to *laffooni*. The only difference of any importance at all were in the markings of the hindtarsi of the female.It seems extremely likely that when more material is available from the Netherlands East Indies, from the Philippines and from the intervening regions, these two will be found to be either synonyms or at the most only subspecies." Since then, the status of the 2 species was open to question.

While working on the *albolineatus* group of the subgenus *Stegomyia*, I discovered 2 female specimens from Celebes which represent 2 closely related species. One of the species, *pseudalbolineatus* is known to occur only in Indonesia (Celebes and Kabaena Island). The 2nd species is *laffooni*, which was previously known only from the Philippines and is reported for the first time from the Celebes.

The collection of *laffooni* and *pseudalbolineatus* from Celebes (Sulawesi) (IV-VII-1966, R. Straatman), suggests that the 2 species are specifically distinct. It has been considered desirable to give a detailed description of the 2 species so that the identity of *laffooni* and *pseudalbolineatus* should no longer remain in doubt.

Through the kindness of Dr. P. F. Mattingly, I have had the opportunity to examine type and other material of *Stegomyia* mosquitoes in the British Museum (Natural History) in 1968. The descriptions of *pseudalbolineatus* are based on the type-series from Celebes.

The nomenclature chosen for the chaetotaxy of the larva and pupa and the terminology of structural parts of the adult follows that of Belkin (1962) and Huang (1977).

Aedes (Stegomyia) laffooni Knight and Rozeboom
(Figs. 1, 2, 3, 4A)

Aedes (Stegomyia) laffooni Knight and Rozeboom 1946: 94 (♂, ♀); Knight and Hull

1951: 221 (L) (key only); Knight and Hull 1952: 186 (? *pseudalbolineatus* ssp.) (taxonomy).

MALE. *Head*. Proboscis dark scaled, without pale scales on ventral side, longer than forefemur; palpus dark, shorter than proboscis, 5-segmented, segments 4,5 subequal, slender, upturned and with only a few short setae; antenna plumose, shorter than proboscis; torus covered with white scales on inner side only; clypeus bare; erect scales dark, not numerous, restricted to occiput; vertex with a patch of narrow white scales at anterior median area continued by a broad median stripe of broad white scales, with broad dark ones on each side interrupted by a lateral stripe of broad white scales followed ventrally by a patch of broad white scales. *Thorax*. Scutum with narrow dark scales and a broad median longitudinal stripe of similar white ones from anterior margin, extending posteriorly to about the level of wing root; a patch of broad white scales on the lateral margin just before the level of the wing root, extending forward over the paratergite; acrostichal bristles absent; dorsocentral bristles present; scutellum with broad white scales on all lobes, with a few broad dark ones on the apex of the midlobe, and sometimes also on the lateral lobes; anterior pronotum with broad white scales; posterior pronotum with broad white scales and a few narrow, dark dorsal ones; paratergite without scales; postspiracular and subspiracular areas without scales; patches of broad white scales on propleuron, upper and lower portions of sternopleuron and upper portion of mesepimeron; lower mesepimeron without bristles; metameron bare. *Wing*. With dark scales on all veins, sometimes with a minute basal spot of white scales on the costa; with 1-2 remigial bristles; cell R_2 about equal to R_{2+3} . *Halter*. With dark scales. *Legs*. Coxae with patches of white scales; knee-spot absent on forefemur, present on mid- and hindfemora; fore- and midfemora anteriorly dark; hindfemur anteriorly with basal white stripe which is usually connected to the apical white scale patch on the lower portion of anterior surface; all tibiae anteriorly dark, without any white band; foretarsus dark; midtarsus usually with a few white basal scales on tarsomere 1; hindtarsus with basal white band on tarsomeres 1-3; tarsal bands usually incomplete ventrally on all except tarsomere 2; the ratio of the length of white band to the total length of tarsomere is 0.20-0.25, 0.25-0.33, 0.25-0.33; foreleg with tarsal claws unequal, the larger one toothed, the smaller one simple; midleg with tarsal claws unequal, both simple; hindleg with tarsal claws equal, simple. *Abdomen*. Segment I with white scales on laterotergite; terga II-IV dark dorsally, with basolateral white spots only; terga V-VII each with a subbasal white band which is connected with the lateral spots, sometimes tergum V with a dotted subbasal white band. *Terminalia*. Basimere about 2.5 times as long as wide, scales restricted to lateral and ventral areas, with several rather long stout setae with slender curved tips on mesal side of dorsal surface and a few shorter and smaller ones scattered on basolateral area of dorsal surface; claspette with 4,5 stout, spine-like setae and several long, stout setae with slender curved tips on distal part, apices of the strongest spine-like setae reaching to the level of apex of basimere; distimere simple, elongate, about 0.70 as long as basimere, tapering to a blunt apical point, with a long, stout, apically blunt spiniform process at basal 0.57; aedeagus with 12-16 apical teeth on

each side; paraproct usually with 2 (1-3) lobe-like apical processes; cercal setae absent; tergum IX with apicomedian margin flat, usually with 5 (3-6) setae on each side.

FEMALE. Essentially as in the male, differing in the following respects: *Head.* Palpus 4-segmented, about 0.12 of proboscis. *Legs.* Knee-spot present on forefemur; midtarsus with a few white basal scales on tarsomeres 1,2; hindtarsus with basal white bands on tarsomeres 1-4; bands usually incomplete ventrally on all except tarsomere 2; the ratio of the length of white band to the total length of tarsomere is 0.25-0.33, 0.33-0.40, 0.33-0.40, 0.20-0.33; fore- and midlegs with tarsal claws equal, all simple. *Abdomen.* Segment VIII completely retracted. *Terminalia.* Sternum VIII shallowly concave apicomediaally; insula longer than broad, with minute setae and with 6,7 larger ones on apical 0.33; tergum IX with lateral lobes, each usually with 4 (3-6) setae; postgenital plate with shallow apical notch; cerci short and broad; 3 spermathecae, one larger than the other 2.

PUPA. *Cephalothorax.* Trumpet about 3.5 as long as median width; setae 1,3-C usually double, longer than 2-C, 2-C usually double (2-4), 4-C with 4,5 branches, 5-C single, long, stout, barbed, much longer than 4-C, 6-C usually double (1-2), much shorter than 7-C, 7-C usually double (1-4), 10-C usually with 3 branches (3-5), caudomesad of 11-C, 11-C single, stout. *Abdomen.* Seta 1-I well developed, with more than 10 dendritic, branches, 2-I single, 3-I single, long, 2,3-I not widely separated, distance between them same as distance between 4, 5-I; 1-II usually with 4 branches (3-5); 3-II-III single, long, about as long as segment III, 1-III usually with 3 branches (3-5); 1-IV usually with 3 branches (2-4), 2-IV, V laterad of 1-IV, V; 5-IV-VI single or double, sometimes 5-VI 2,3 forked, long, reaching beyond posterior margin of following segment; 9-I-VI small, single, simple; 9-VII, VIII much longer and stouter than preceeding ones, 9-VII usually with 5 barbed branches (4-8), 9-VIII usually with 17 barbed branches (14-21). *Paddle.* Margins without fringe of very long hair-like spicules, with slight spicules only; seta 1-P usually with 6-8 branches (3-8).

LARVA. *Head.* Antenna 0.5 length of head, with fine basal spicules; seta 1-A inserted slightly beyond middle from base of shaft, usually single (1-3); inner mouth brushes pectinate at apex; seta 4-C well developed, branched, closer to 6-C than 5-C, cephalomesad of 6-C, 5-C usually with 9-11 branches, 6-C usually single (1,2), 7-C with 9-13 branches, 8,10,13-C single, 9-C usually with 3 branches (3-4), 11-C stellate, usually with 12-15 branches, 12-C with 4-6 branches, 14-C stellate, usually with 10 branches (10-14), 15-C usually with 3 branches (3-6); mentum with 11,12 teeth on each side. *Thorax.* Seta 1-P stellate, usually with 14 branches (12-15), 2-P single, 3-P stellate, usually with 11,12 branches, 4-P usually single, long, 5-P stellate, usually with 16 branches (12-16), 6-P single, long, 7-P usually double (2-3), long, 9-P stellate, with 6-8 branches, 11-P usually double, small, 14-P usually with 3 branches (2-4); 5,7-M single, 6-M usually with 7,8 barbed branches, 8-M usually with 10 barbed branches (7-10), 9-M usually with 10 barbed branches (7-11), 10,12-M single, long, stout, barbed, 11-M with 2-4 branches,

small; 7-T with 11-13 barbed branches, 9-T usually with 8-9 barbed branches, 10,11-T similar to 10,11-M, 12-T much reduced. *Abdomen*. Seta 6-I, II usually with 4,5 branches, 7-I single; 7-II stellate, with 8,9 branches; 6-III-VI double; 1-VII stellate, usually with 18 branches, 2-VII stellate, usually with 7 branches; 2-VIII single, distant from 1-VIII, 1-VIII stellate, with 14-17 branches, 3-VIII usually with 8 branches (7-10), 4-VIII single, 5-VIII stellate, with 13-14 branches; comb of 10-14 scales in a row, not arising from a sclerotized plate, each scale with free portion rather slender and long, about 2.0 times as long as attached portion, without fine denticles on basal portion of apical spine; saddle of segment X incomplete, marginal spicules long, spine-like and conspicuous; seta 1-X usually with 3 branches (3-4), 2-X usually with 8 branches, 3-X single, 4-X with 5 pairs of setae on grid, each seta usually with 6,7 branches, no precratal tufts; anal papillae lanceolate, about 1.12-1.15 length of saddle. *Siphon*. About 2.10-2.40 as long as wide, acus present; 3-6 pecten teeth in a straight row, each tooth without basal denticles; seta 1-S usually with 4 branches (3-4), inserted beyond last tooth and in line with the teeth.

TYPE-DATA. *Aedes (Stegomyia) laffooni* Knight and Rozeboom, holotype male, with terminalia on slide, in U. S. National Museum, Washington, D. C. (USNM); type-locality : 2 miles inland from San Ramon, *Mindanao*, PHILIPPINES, IX-17-1945 (Jean Laffoon). Paratypes : 2 females, with same data as holotype; 1 female, Maasin Village, Zamboanga Province, *Mindanao*, PHILIPPINES, IX-25-1945 (Jean Laffoon), in USNM.

DISTRIBUTION. 37 specimens examined : 9♂, 8♀, 9♂ terminalia, 3♀ terminalia, 4 individual rearings (4 l, 4 p).

PHILIPPINES. *Mindanao* : San Ramon (IX-17-1945, J. Laffoon), 1♂, 2♀, 1♂ terminalia; Zamboanga Province, Maasin Village (IX-25-1945, J. Laffoon), 1♀, 1♀ terminalia; Davao (V-3-1946, J. Enke and A. Corcega), 1♀, 1 individual rearing (1 l, 1 p); (V-5-1946, J. Enke and A. Corcega), 1♂, 1♂ terminalia; (V-11-1946, J. Enke and H. Hoogstraal), 1♂, 1♀, 1♂ terminalia; (V-14-1946, II-27-1947, J. Enke and H. Hoogstraal), 2♂, 2♂ terminalia; (X-16-1946, H. Hoogstraal), 1♂, 1♀, 1♂ terminalia, 1♀ terminalia, 2 individual rearings (2 l, 2 p); Cotabato (IV-28-1946, J. Enke et al), 1♂, 1♂ terminalia, 1 individual rearing (1 l, 1 p); (V-14-1946, J. Enke and H. Hoogstraal), 1♂, 1♂ terminalia. *Basilan I.* : Isabela (1945, Rozeboom, Knight and Laffoon), 1♂, 1♀, 1♂ terminalia, 1♀ terminalia.

INDONESIA. *Celebes*: Sulawesi, Lambarese, 113 km NE of Palopo (VII-1966, R. Straatman), 1♀.

TAXONOMIC DISCUSSION. The adult differs from all members of the *albolineatus* group except *pseudalbolineatus* in having (1) the scutellum with broad white scales on all lobes, (2) median scutal stripe extending posteriorly to the level of wing root and (3) scutum with a patch of broad white scales on lateral margin just before the level of wing root. It is extremely similar to *pseudalbolineatus* but can be distinguished from it in the male by hindtarsomere

2 with a white band on at least basal 0.25 and in the female by hindtarsomere 3 at most, white on basal 0.50 dorsally. In *pseudalbolineatus*, the male hindtarsomere 2 has at most a white band on basal 0.20 and the female hindtarsomere 3 has at least basal 0.87 white dorsally.

The male terminalia of *laffooni* are very similar to those of *pseudalbolineatus*, having (1) the paraproct with apical lobed process, (2) distimere simple, elongate, with a long, stout, submedial spiniform process, (3) claspette with 4,5 stout, spine-like setae and several long, stout setae with slender curved tips on distal part and (4) tergum IX with apicomedian margin flat. However, they can be distinguished from those of *pseudalbolineatus* by having the apices of the strongest spine-like setae of claspette reaching to the level of apex of basimere.

The pupa differs from the other known members of the *albolineatus* group is having (1) seta 5-C strongly developed, very long, much longer than 4-C, (2) seta 5-VI single or double, or 2,3 forked, usually long, reaching beyond posterior margin of following segment and (3) seta 9-VIII large, usually with 17 (14-21) branches.

The larva differs from the other members of the *albolineatus* group in having (1) the marginal spicules on saddle of segment X long and conspicuous, (2) seta 5-P short, much shorter than 7-P, (3) comb scale with free portion rather slender and long, about 2.0 times as long as attached portion, without fine denticles on basal portion of apical spine and (4) comb scales in a single row, not arising from a sclerotized plate.

BIONOMICS. The immature stages of *laffooni* have been collected from tree holes and bamboo stumps in Mindanao, Philippines. It occurred in Mindanao at about 155 m elevation (Knight and Rozeboom 1946 : 95).

Aedes (Stegomyia) pseudalbolineatus Brug
(Figs. 4B, 4C, 4D, 5)

Aedes (Stegomyia) pseudalbolineatus Brug 1939 : 103 (♂*, ♀, L); Knight and Rozeboom 1946 : 88 (♂, ♀, L).

MALE. *Head*. Proboscis dark scaled, without pale scales on ventral side, longer than forefemur; palpus dark, shorter than proboscis, 5-segmented, segments 4,5 subequal, slender, upturned and with only a few short setae; antenna plumose, shorter than proboscis, torus covered with white scales on inner side only; clypeus bare; erect scales dark, not numerous, restricted to occiput; vertex with a patch of narrow white scales at anterior median area continued by a broad median stripe of broad white scales, with broad dark ones on each side interrupted by a lateral stripe of broad white scales followed by a patch of broad white scales ventrally. *Thorax*. Scutum with narrow dark scales and a broad median longitudinal stripe of similar white ones from anterior margin, extending posteriorly to about the level of wing root; a patch

of broad white scales on the lateral margin just before the level of the wing root, extending forward over the paratergite; acrostichal bristles absent; dorsocentral bristles present; scutellum with broad white scales on all lobes, with a few broad dark ones on the apex of the midlobe, sometimes also on the lateral lobes; anterior pronotum with broad white scales; posterior pronotum with broad white scales and a few narrow dark ones dorsally; paratergite without scales; postspiracular and subspiracular areas without scales; patches of broad white scales on propleuron, upper and lower portions of sternopleuron and upper portion of mesepimeron; lower mesepimeron without bristles; metameron bare. *Wing*. With dark scales on all veins; with 1-2 remigial bristles; cell R_2 about equal to R_{2+3} . *Halter*. With dark scales. *Legs*. Coxae with patches of white scales; knee-spot absent on forefemur, present on mid- and hindfemora; fore- and midfemora anteriorly dark; hindfemur anteriorly with basal 0.75 white, a dark patch present which usually separates the basal white stripe from the apical white scale patch; all tibiae anteriorly dark, without any white band; foretarsus dark; midtarsus usually with a few white basal scales on tarsomere 1; hindtarsus with basal white bands on tarsomeres 1-3, none of the bands complete ventrally, ratio of the length of white band to the total length of tarsomere is 0.20, 0.17-0.20, 0.14-0.17; foreleg with tarsal claws unequal, the larger one toothed, the smaller one simple; midleg with tarsal claws unequal, both simple; hindleg with tarsal claws equal, simple. *Abdomen*. Segment I with white scales on laterotergite; terga II-IV dark dorsally, with basolateral white spots only; terga V-VII each with a subbasal white band which is connected with the lateral spots, sometimes tergum V with a dotted subbasal white band. *Terminalia*. Basimere about 2.5 times as long as wide, scales restricted to lateral and ventral areas, with several rather long setae on mesal side of dorsal surface, and a few shorter and smaller ones scattered on lateral half of dorsal surface; claspette with 4,5 stout, spine-like setae, and several long, stout setae with slender curved tips on distal part, apices of the strongest spine-like setae not reaching to the level of apex of basimere; distimere simple, elongate, about 0.70 as long as basimere, tapering to a blunt apical point, with a long, stout, apically blunt spiniform process at basal 0.57-0.64; aedeagus with 12-16 apical teeth on each side; paraproct usually with 2 (1-3) lobe-like processes apically; cercal setae absent; tergum IX with apicomedian margin flat, usually with 5 (3-6) setae on each side.

FEMALE. Essentially as in the male, differing in the following respects: *Head*. Palpus 4-segmented, about 0.12 of proboscis. *Legs*. Knee-spot present on forefemur; hindtarsus with basal white band on tarsomeres 1-4, none of the bands complete ventrally, ratio of the length of each white band to the total length of tarsomere is 0.20, 0.20-0.25, 0.87-1.00, 0.75; (cotype female only one pale scale on tarsomere 4); fore- and midlegs with tarsal claws equal, simple. *Abdomen*. Segment VIII completely retracted. *Terminalia*. Sternum VIII shallowly concave apicomediaally; insula longer than broad, with minute setae and with 7 larger ones on apical 0.33; tergum IX with apicolateral lobes, each with 6 setae; postgenital plate with shallow apical notch; cerci short and broad; 3 spermathecae, one larger than the other 2.

TYPE-DATA. *Aedes (Stegomyia) pseudalbolineatus* Brug, holotype male, with terminalia on slide (13167), in British Museum (Natural History), London (BMNH); type-locality : Malino, *Celebes*, INDONESIA, VI-1937 (S. L. Brug). Co-type female, *Kabaena Island*, INDONESIA, 10-V-1937 (S. L. Brug), in BMNH.

DISTRIBUTION. 15 specimens examined : 4♂, 6♀, 4♂ terminalia, 1♀ terminalia.

INDONESIA. *Celebes* : Malino (VI-1937, S. L. Brug), 3♂ (#13167, #13161, #13148), 2♀ (#13150, #13166), 3♂ terminalia; Laboean Beroko (II-23-1937, S. L. Brug), 1♂ (#12486), 2♀ (#12487, #12441), 1♂ terminalia; Sulawesi pedemaran, 12 km E of Rantepao, Torodja (IV-18-25-1966, R. Straatman), 1♀, 1♀ terminalia. *Kabaena Island* (10-V-1937, S. L. Brug), 1♀.

TAXONOMIC DISCUSSION. *Aedes (Stegomyia) pseudalbolineatus* Brug is a member of the *albolineatus* group. The adult has the scutellum with broad white scales on all lobes and the median scutal stripe extending posteriorly to the level of wing root. It can thus easily be distinguished from those of all other species except *arboricola* Knight and Rozeboom and *laffooni* Knight and Rozeboom. It differs from that of *arboricola* by the scutum with a patch of broad white scales on lateral margin just before the level of wing root. It can also be distinguished from that of *laffooni* by the diagnostic characters mentioned under the discussion of that species.

The male terminalia of this species are very similar to those of *arboricola* and *laffooni*, having (1) the paraproct with apical lobed process, (2) spiniform process of distimere at or beyond middle, (3) lateral plate of aedeagus with more than 10 apical teeth, and (4) claspette with 3-5 rather long, stout, spine-like setae and several long setae with slender curved apices. They differ from those of *arboricola* by the apices of the strongest spine-like setae of claspette not reaching to the level of apex of basimere and tergum IX with apicomedian margin flat. They can be distinguished from those of *laffooni* by the diagnostic character mentioned under the discussion of that species.

No specimens of the larva of *pseudalbolineatus* are available for comparison and the pupa is unknown.

BIONOMICS. The immature stages of *pseudalbolineatus* have been found in a broken bottle, bamboo stumps and tree holes in the Celebes. It occurred in Malino at 1000 m altitude (Brug 1939 : 104).

ACKNOWLEDGEMENTS

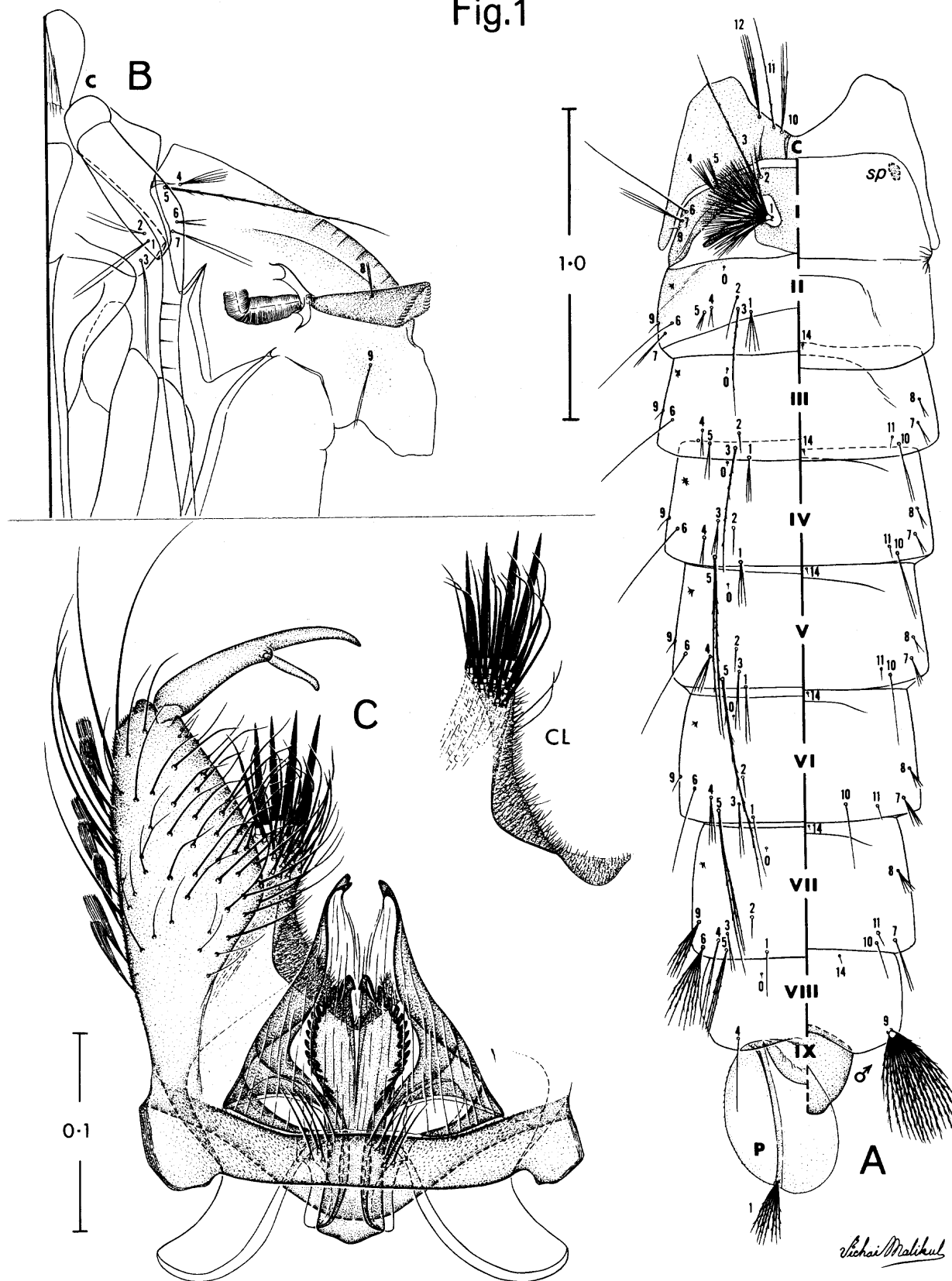
I am grateful to Dr. Ronald A. Ward and Mr. E. L. Peyton for a critical review of the manuscript and their valuable comments. I also extend my thanks to Mr. Vichai Malikul for preparing the drawings.

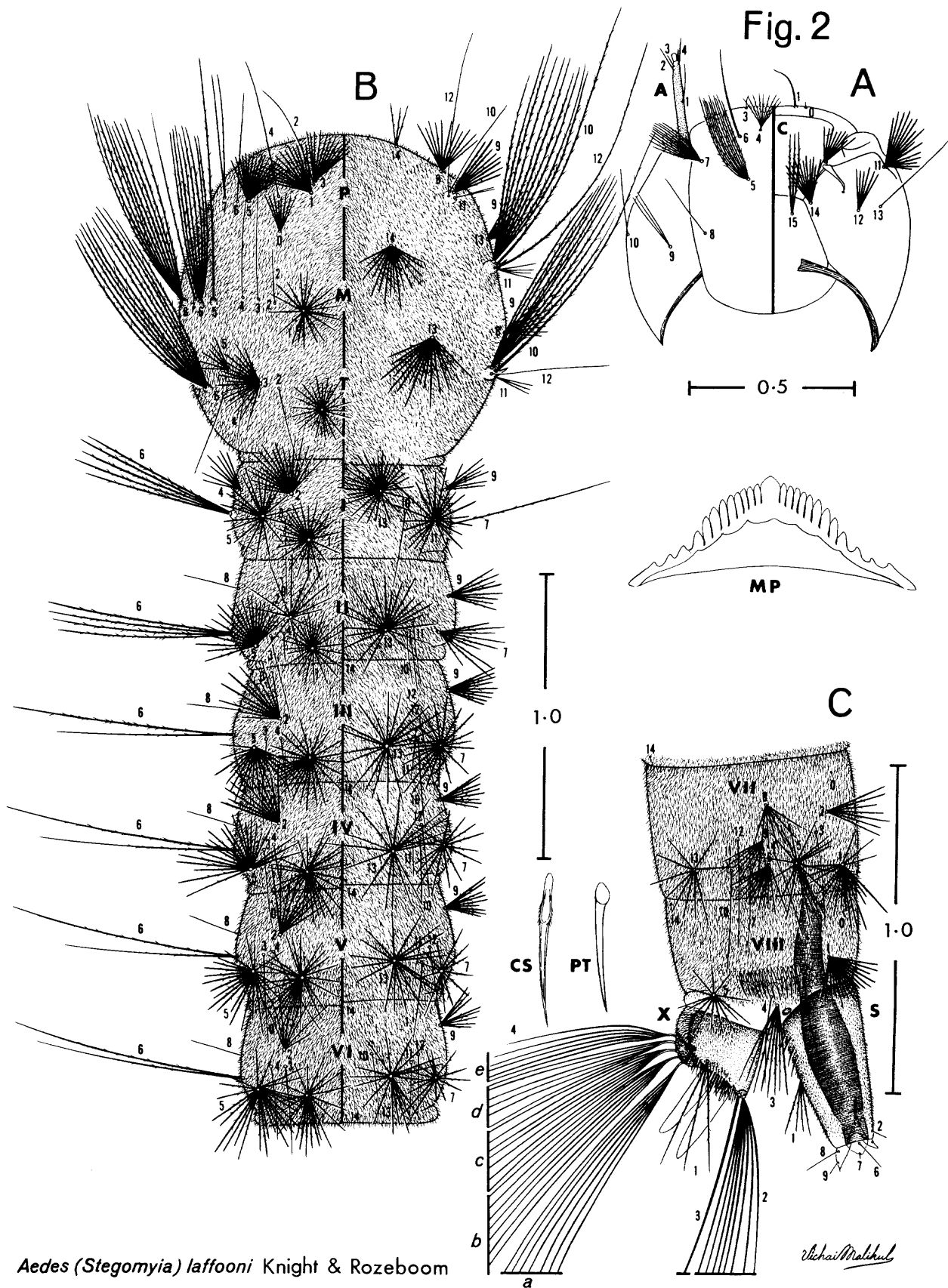
I also wish to express my gratitude to Dr. P. F. Mattingly, Department of Entomology, British Museum (Natural History), London, for the loan of material of the type-series of *pseudalbolineatus* described above, and to Dr. W. A. Steffan, Department of Entomology, Bernice P. Bishop Museum, Honolulu, for the loan of the 2 Celebes specimens of *laffooni* and *pseudalbolineatus*.

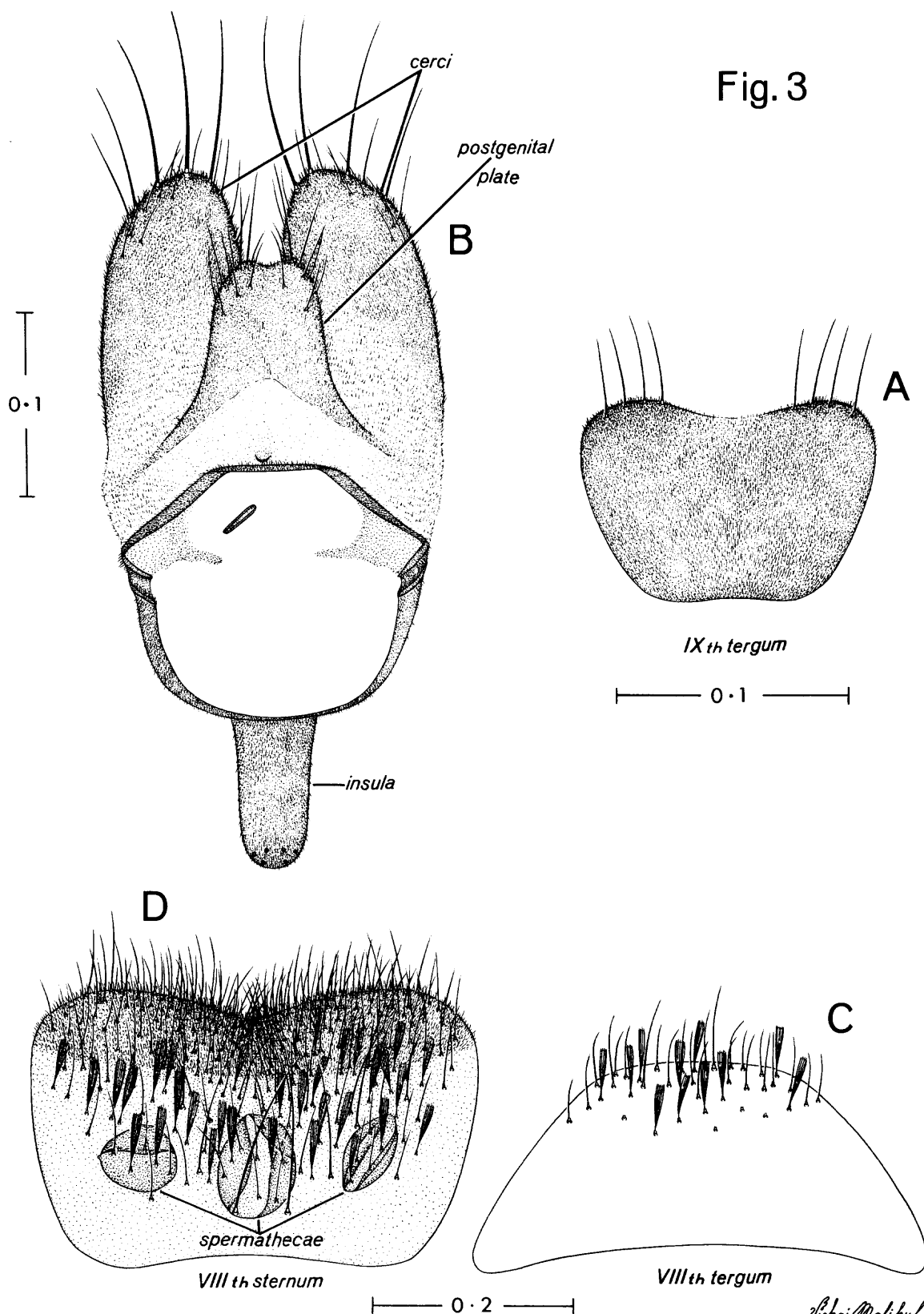
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Fig.1

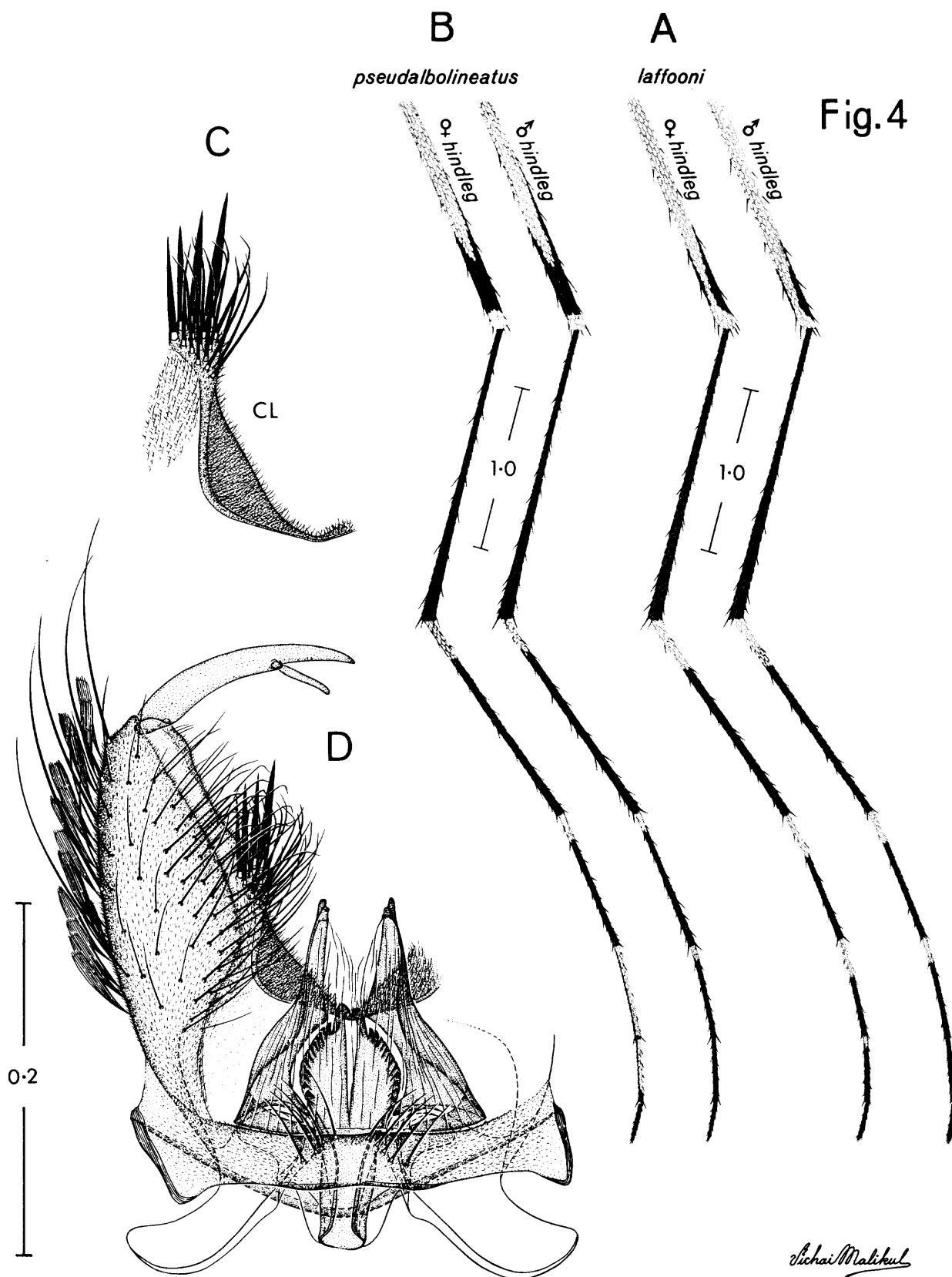
*Aedes (Stegomyia) laffooni* Knight & Rozeboom



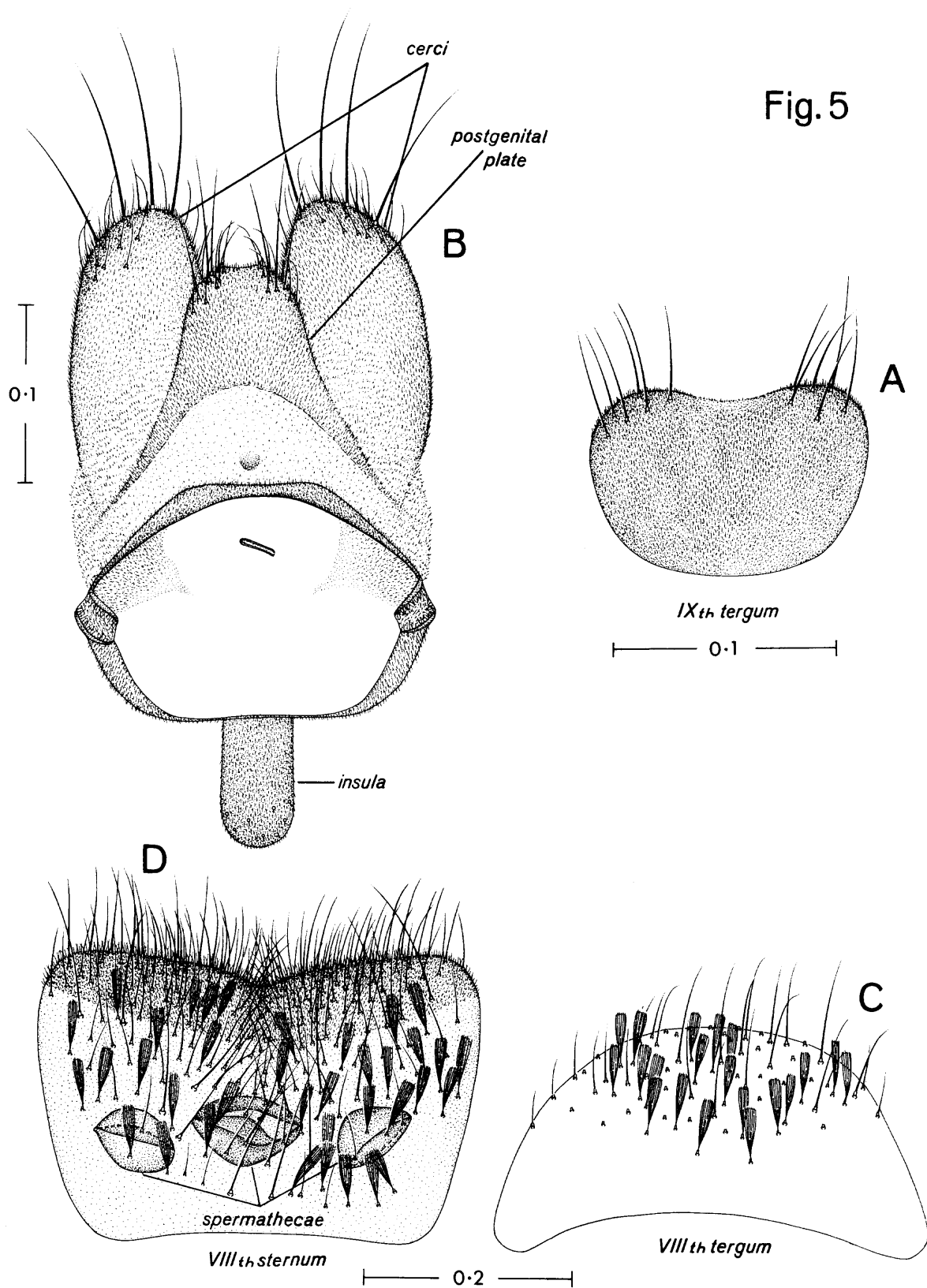


Aedes (Stegomyia) laffooni Knight & Rozeboom

Pichai Malikul



Aedes (Stegomyia) pseudalbolineatus Brug



Aedes (Stegomyia) pseudalbolineatus Brug

Sichai Malikul